

CB



PCT09

RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/890,475

DATE: 01/22/2002

TIME: 16:34:40

Input Set : A:\mewburn.app

Output Set: N:\CRF3\01182002\I890475.raw

ENTERED

3 <110> APPLICANT: Johanson, Urban
 4 West, Joanne
 5 Dean, Caroline
 7 <120> TITLE OF INVENTION: Arabidopsis thaliana derived Frigida gene conferring late
 flowering
 9 <130> FILE REFERENCE: Mewburn
 11 <140> CURRENT APPLICATION NUMBER: US 09/890,475
 C--> 12 <141> CURRENT FILING DATE: 2001-11-13
 14 <150> PRIOR APPLICATION NUMBER: PCT/GB00/00197
 15 <151> PRIOR FILING DATE: 2000-01-25
 17 <150> PRIOR APPLICATION NUMBER: GB 9902660.1
 18 <151> PRIOR FILING DATE: 1999-02-05
 20 <160> NUMBER OF SEQ ID NOS: 58
 22 <170> SOFTWARE: PatentIn Ver. 2.1
 24 <210> SEQ ID NO: 1
 25 <211> LENGTH: 609
 26 <212> TYPE: PRT
 27 <213> ORGANISM: Artificial Sequence
 29 <220> FEATURE:
 30 <223> OTHER INFORMATION: Description of Artificial Sequence: FRI amino acid
 31 sequence predicted from the cDNA sequence
 33 <400> SEQUENCE: 1
 34 Met Ser Asn Tyr Pro Pro Thr Val Ala Ala Gln Pro Thr Thr Thr Ala
 35 1 5 10 15
 37 Asn Pro Leu Leu Gln Arg His Gln Ser Glu Gln Arg Arg Arg Glu Leu
 38 20 25 30
 40 Pro Lys Ile Val Glu Thr Glu Ser Thr Ser Met Asp Ile Thr Ile Gly
 41 35 40 45
 43 Gln Ser Lys Gln Pro Gln Phe Leu Lys Ser Ile Asp Glu Leu Ala Ala
 44 50 55 60
 46 Phe Ser Val Ala Val Glu Thr Phe Lys Arg Gln Phe Asp Asp Leu Gln
 47 65 70 75 80
 49 Lys His Ile Glu Ser Ile Glu Asn Ala Ile Asp Ser Lys Leu Glu Ser
 50 85 90 95
 52 Asn Gly Val Val Leu Ala Ala Arg Asn Asn Asn Phe His Gln Pro Met
 53 100 105 110
 55 Leu Ser Pro Pro Arg Asn Asn Val Ser Val Glu Thr Thr Val Thr Val
 56 115 120 125
 58 Ser Gln Pro Ser Gln Glu Ile Val Pro Glu Thr Ser Asn Lys Pro Glu
 59 130 135 140
 61 Gly Gly Arg Met Cys Glu Leu Met Cys Ser Lys Gly Leu Arg Lys Tyr
 62 145 150 155 160
 64 Ile Tyr Ala Asn Ile Ser Asp Gln Ala Lys Leu Met Glu Glu Ile Pro
 65 165 170 175

RAW SEQUENCE LISTING

DATE: 01/22/2002

PATENT APPLICATION: US/09/890,475

TIME: 16:34:40

Input Set : A:\mewburn.app

Output Set: N:\CRF3\01182002\I890475.raw

```

67 Ser Ala Leu Lys Leu Ala Lys Glu Pro Ala Lys Phe Val Leu Asp Cys
68      180      185      190
70 Ile Gly Lys Phe Tyr Leu Gln Gly Arg Arg Ala Phe Thr Lys Glu Ser
71      195      200      205
73 Pro Met Ser Ser Ala Arg Gln Val Ser Leu Leu Ile Leu Glu Ser Phe
74      210      215      220
76 Leu Leu Met Pro Asp Arg Gly Lys Gly Lys Val Lys Ile Glu Ser Trp
77 225      230      235      240
79 Ile Lys Asp Glu Ala Glu Thr Ala Ala Val Ala Trp Arg Lys Arg Leu
80      245      250      255
82 Met Thr Glu Gly Gly Leu Ala Ala Ala Glu Lys Met Asp Ala Arg Gly
83      260      265      270
85 Leu Leu Leu Leu Val Ala Cys Phe Gly Val Pro Ser Asn Phe Arg Ser
86      275      280      285
88 Thr Asp Leu Leu Asp Leu Ile Arg Met Ser Gly Ser Asn Glu Ile Ala
89      290      295      300
91 Gly Ala Leu Lys Arg Ser Gln Phe Leu Val Pro Met Val Ser Gly Ile
92 305      310      315      320
94 Val Glu Ser Ser Ile Lys Arg Gly Met His Ile Glu Ala Leu Glu Met
95      325      330      335
97 Val Tyr Thr Phe Gly Met Glu Asp Lys Phe Ser Ala Ala Leu Val Leu
98      340      345      350
100 Thr Ser Phe Leu Lys Met Ser Lys Glu Ser Phe Glu Arg Ala Lys Arg
101      355      360      365
103 Lys Ala Gln Ser Pro Leu Ala Phe Lys Glu Ala Ala Thr Lys Gln Leu
104      370      375      380
106 Ala Val Leu Ser Ser Val Met Gln Cys Met Glu Thr His Lys Leu Asp
107 385      390      395      400
109 Pro Ala Lys Glu Leu Pro Gly Trp Gln Ile Lys Glu Gln Ile Val Ser
110      405      410      415
112 Leu Glu Lys Asp Thr Leu Gln Leu Asp Lys Glu Met Glu Glu Lys Ala
113      420      425      430
115 Arg Ser Leu Ser Leu Met Glu Glu Ala Ala Leu Ala Lys Arg Met Tyr
116      435      440      445
118 Asn Gln Gln Ile Lys Arg Pro Arg Leu Ser Pro Met Glu Met Pro Pro
119      450      455      460
121 Val Thr Ser Ser Ser Tyr Ser Pro Ile Tyr Arg Asp Arg Ser Phe Pro
122 465      470      475      480
124 Ser Gln Arg Asp Asp Asp Gln Asp Glu Ile Ser Ala Leu Val Ser Ser
125      485      490      495
127 Tyr Leu Gly Pro Ser Thr Ser Phe Pro His Arg Ser Arg Arg Ser Pro
128      500      505      510
130 Glu Tyr Met Val Pro Leu Pro His Gly Gly Leu Gly Arg Ser Val Tyr
131      515      520      525
133 Ala Tyr Glu His Leu Ala Pro Asn Ser Tyr Ser Pro Gly His Gly His
134      530      535      540
136 Arg Leu His Arg Gln Tyr Ser Pro Ser Leu Val His Gly Gln Arg His
137 545      550      555      560
139 Pro Leu Gln Tyr Ser Pro Pro Ile His Gly Gln Gln Gln Leu Pro Tyr

```

RAW SEQUENCE LISTING

DATE: 01/22/2002

PATENT APPLICATION: US/09/890,475

TIME: 16:34:40

Input Set : A:\mewburn.app

Output Set: N:\CRF3\01182002\I890475.raw

```

140                               565                               570                               575
142 Gly Ile Gln Arg Val Tyr Arg His Ser Pro Ser Glu Glu Arg Tyr Leu
143                               580                               585                               590
145 Gly Leu Ser Asn Gln Arg Ser Pro Arg Ser Asn Ser Ser Leu Asp Pro
146                               595                               600                               605
148 Lys
153 <210> SEQ ID NO: 2
154 <211> LENGTH: 3761
155 <212> TYPE: DNA
156 <213> ORGANISM: Arabidopsis thaliana
158 <400> SEQUENCE: 2
159 agtactcaca agtcacaaact taaaccaagt acacaaggat tttatcatgg gattatcgtg 60
160 tttgaagact aaaaagagca caccatcacc ccatttagtg caggtagagt aagacagtaa 120
161 cttttgggtt catattaccg agcaagaacc gttatttgtg attagacatg ttataaacca 180
162 ctgctttagt gactatttaa aacaatatat tacatgtcgt aatcatgcaa cctaactatg 240
163 ttttcattaa tcaaatataa agaataaaga gaaaagtgcg tagattcaat tatttggcat 300
164 agactcaaaa gagtgtatat atatctgact tttattaaat tattaaacac aaatacatat 360
165 tttcataagc aaaactataa aagccctaaa catataatga ttacctcaa ggaaaaagtc 420
166 gttttctcct acttaaaaga taggttactt cctaattaat atataattta tgtgaacttc 480
167 acaatataca gttcaataaa atttggtaat ttgaccgatt taaggagagt ggaaattagg 540
168 gcttctgcaa tcttttttct tcgcgcgaat ctcatgtcca attatccacc gacggtggcg 600
169 gcgcaaccca caacgacggc gaatccactg ctgcagcgac atcaatctga acagcgacga 660
170 agagaattac cgaagattgt cgaaacagag tctacaagta tggacattac gatcggtcaa 720
171 tctaagcagc ctcaattttt gaaatccata gacgaattag ctgcgttttc agttgcagtg 780
172 gaaacattca aacgccaatt cgatgatctt cagaagcaca tcgagtcaat cgaaaacgca 840
173 attgattcca aactcgagag taacggcggt gtctcgccg cgcggaacaa taatttccat 900
174 cagccgatgt tatcgctcc gcggaacaat gtatctgtag aaaccaccgt cactgtgagc 960
175 caaccgtctc aggagattgt accggagacg tcgaataaac cggagggggg acgtatgtgt 1020
176 gagttgatgt gtagcaaagg tctgcgtaaa tacatatacg cgaatatctc tgatcaagct 1080
177 aagttaatgg aagagattcc ttcagctttg aaattggcca aggagccagc gaagtttgta 1140
178 ttggattgta ttggcaagtt ttacttaciaa gggcgtagag catttactaa agagtcgcct 1200
179 atgagctctg cgagacaagt ttcgcttctt atactggagt cttttcttct aatgcctgat 1260
180 cgtggtaaa ggaagggtgaa gattgagagt tggattaaag atgaggcgga gacggctgct 1320
181 gttgcttggg ggaagggtt gatgactgaa ggaggattag ctgcggctga gaaaatggat 1380
182 gcaaggggtt tgcttttact agttgcttgt tttggtgttc cttcaaactt taggagtaca 1440
183 gatttgctgg atttgataag gatgagtggg tcgaatgaga ttgcccgtgc tttgaagcgg 1500
184 tcacagtttc ttgtccctat ggtctcagg accatattct gttctcactc ggtgaatttc 1560
185 attgcaaagg tggttccttt tgttgacatc atcgaccaac atcaagttcc atctttgttt 1620
186 ttcgataagc ttgatggtat aaactaggag agcacatcaa atatttagag tgcaatgact 1680
187 gattgagcca aatcctagct agaaattaat ctggaaagaa cttggaactc tcaaccatag 1740
188 gttttggtac gaaattgttg cttgtcagaa ccaaatgata ggctattgcc ttgaaatagt 1800
189 gtttcttgty gtttccaata ttggaagtta aaatcgtagt acttagctgt tggatactaa 1860
190 ttaagcttaa gcaatgccaa ctctaagaag tggtaactac acaatattct attggtcata 1920
191 ggtatagttg aatcaagtat caagcgtgga atgcatattg aagctcttga gatggtttat 1980
192 acctttggca tggaggataa gttttcagct gctctagttc taacttcatt cttaaagatg 2040
193 agcaaggagt catttgagag ggcaaaacgg aaagcccagt caccgctggc atttgatga 2100
194 accttccct tgcacattat gtacctttat gaactcttta tcatcatctg agtctgacca 2160
195 ttgatataat tatttctcaa cagaagaag cggctacaaa gcagctagct gtgttatcat 2220
196 cagttatgca gtgtatggag actcacaagt tagatcctgc gaaagaacta ccaggatggc 2280

```

RAW SEQUENCE LISTING

DATE: 01/22/2002

PATENT APPLICATION: US/09/890,475

TIME: 16:34:40

Input Set : A:\mewburn.app

Output Set: N:\CRF3\01182002\I890475.raw

```

197 agatcaaaga gcaaattggt agcttggaga aagacactct tcagctcgac aaagagatgg 2340
198 aagagaaagc aagatctctc agtttaattg aggaagccgc acttgccaag agaattgtata 2400
199 accaacagat aaaacgtcca aggttgtcac ccattggaaat gccaccagta acttcttcat 2460
200 cgtattctcc tatctaccgt gatagaagct ttcttagtca aagagacgat gaccaagatg 2520
201 aaatatcagc tcttgtgagt agttacctcg gcccgtaaac atcttttctt catcgctcaa 2580
202 gaagatcccc ggaatatatg gttccacttc cacatggtgg gttaggaaga agtgtatatg 2640
203 catatgaaca tctggcccca aattcatact ctccaggcca cggacataga ctccatcgac 2700
204 agtactctcc gtctttgggt caccggacaga gacatccact acagtactct cctccaattc 2760
205 atggacaaca acagttacca tatggtatac aaaggggtta cagacattca ccatctgaag 2820
206 aaagatatct gggtttatcc aatcaaaggt ctctctcgag taactcatca ttagacccca 2880
207 aataggagga atgtaaatct gtaacaaagc tttttgtttt tgcttaagtt agtcatttat 2940
208 ttaactccca acagtctcaa aatttaattt aatgtttggg gcttaagaat gcaaattttt 3000
209 ttgctcctgt aattgacatt taagatgcta atgttattgc ttcagagggt ttagtcaacc 3060
210 tcagatacat cgatatcact atctaaatag acctctgggt cttgggtcatc tggattctct 3120
211 tcattctctg tctctgttcc ttcttgttct cgttgcaactg ctccagcaat tgcggattcc 3180
212 aaccttgtgc ttacagtttc ccattgacaca agcttttcca tgaatgtatt tatgtccgcc 3240
213 ttcttatctt tcttgaggaa gatgaattca ccgaagatcc aacttgagct tgacaatcaa 3300
214 tcaaatccga aacagaaaca gagctttttg acatctttga tttagcagtc tttgatcttg 3360
215 aggaatatca atgaacacta gatacactca cacttgcagg ctttaaaactg gattttaaac 3420
216 atgaatagaa gcattgattc catggaatgt ggtaagtgc atagctggac ttcttaaaaca 3480
217 aatgtatgaa cgggtagggt tcattacaat gtagttatac agcactgaga tttatggaag 3540
218 aaaaaaagga cacagcttta gatattotaca gagagacaag aacactaaag acaagagaat 3600
219 cataagttca ggagttcggt aaaatggctc tattcaaata acacattggc acaagaccac 3660
220 taataagata ccaagtggga caatcgaaag agaataagag atagcatatc agagagagag 3720
221 agagattttt tgaggaggga gaagtctgcc ggaggcttct g 3761
224 <210> SEQ ID NO: 3
225 <211> LENGTH: 2257
226 <212> TYPE: DNA
227 <213> ORGANISM: Artificial Sequence
229 <220> FEATURE:
230 <223> OTHER INFORMATION: Description of Artificial Sequence: likely cDNA
231 sequence of the H51 FRI gene
233 <400> SEQUENCE: 3
234 catgtcgtaa tcatgcaacc taactatggt ttcatthaatc aaatacaaag aataaagaga 60
235 aaagtgcgta gattcaatta tttggcatag actcaaaaga gtgtatatat atctgacttt 120
236 tattaattaa ttaaacacaa atacatattt tcataagcaa aactataaaa gccctaaaca 180
237 tataatgatt acctcaaagg aaaaagtcgt tttctcttac ttaaaagata ggtaacttcc 240
238 taattaatat ataatttatg tgaacttcac aatatacagt tcaataaaat ttggttaatt 300
239 gaccgattta aggagagtgg aaattagggc ttctgcaatc ttttttcttc gccgcaatct 360
240 catgtccaat tatccaccga cgggtggcggc gcaaccacac acgacggcga atccactgct 420
241 gcagcgacat caatctgaac agcgacgaag agaattaccg aagattgtcg aaacagagtc 480
242 tacaagtatg gacattacga tcggtcaatc taagcagcct caatttttga aatccataga 540
243 cgaattagct gcgttttctg ttgcagtgga aacattcaaa cgccaattcg atgatcttca 600
244 gaagcacatc gagtcaatcg aaaacgcaat tgattccaaa ctccagagta acggcgttgt 660
245 cctcgccgcg cggaacaata atttccatca gccgatgtta tcgcctccgc ggaacaatgt 720
246 atctgtagaa accaccgtca ctgtgagcca accgtctcag gagattgtac cggagacgtc 780
247 gaataaaccg gagggggggc gtatgtgtga gttgatgtgt agcaaaggtc tgcgtaaata 840
248 catatacgcg aatatctctg atcaagctaa gttaatggaa gagattcctt cagctttgaa 900
249 attggccaag gagccagcga agtttgtatt ggattgtatt ggcaagtttt acttacaagg 960

```

RAW SEQUENCE LISTING

DATE: 01/22/2002

PATENT APPLICATION: US/09/890,475

TIME: 16:34:40

Input Set : A:\mewburn.app

Output Set: N:\CRF3\01182002\I890475.raw

```

250 gcgtagagca tttactaaag agtcgcctat gagctctgcg agacaagttt cgcttcttat 1020
251 actggaggtct tttcttctaa tgcctgatcg tggtaaaggg aagggtgaaga ttgagagttg 1080
252 gattaaagat gaggcggaga cggctgctgt tgcctggagg aaaaggttga tgactgaagg 1140
253 aggattagct gcggctgaga aaatggatgc aaggggtttg cttttactag ttgcttgttt 1200
254 tgggtgttct tcaaaacttta ggagtacaga tttgctggat ttgataagga tgagtggttc 1260
255 gaatgagatt gccggtgctt tgaagcggtc acagtttctt gtccctatgg tctcaggtat 1320
256 agttgaatca agtatcaagc gtggaatgca tattgaagct cttgagatgg tttatacctt 1380
257 tggcatggag gataagtttt cagctgctct agttctaact tcattcttaa agatgagcaa 1440
258 ggagtcattt gagagggcaa aacggaaagc ccagtcaccg ctggcattta aagaagcggc 1500
259 tacaaagcag ctagctgtgt tatcatcagt tatgcagtgt atggagactc acaagttaga 1560
260 tcctgcgaaa gaactaccag gatggcagat caaagagcaa attgttagct tggagaaaga 1620
261 cactcttcag ctcgacaaag agatggaaga gaaagcaaga tctctcagtt taatggagga 1680
262 agccgcactt gccaaagaga tgtataacca acagataaaa cgtccaaggt tgtcacccat 1740
263 ggaatgccca ccagtaactt cttcacgta ttctcctatc taccgtgata gaagctttcc 1800
264 tagtcaaaga gacgatgacc aagatgaaat atcagctctt gtgagtagtt acctcgcccc 1860
265 gtcaacatct tttcctcatc gctcaagaag atccccggaa tatatggttc cacttccaca 1920
266 tgggtgggtta ggaagaagtg tatatgcata tgaacatctg gccccaaatt catactctcc 1980
267 aggtcacgga catagacttc atcgacagta ctctccgtct ttgggttcacg gacagagaca 2040
268 tccactacag tactctcttc caattcatgg acaacaacag ttaccatatg gtatacaaa 2100
269 ggtttacaga cattcaccat ctgaagaaag atatttgggt ttatccaatc aaaggtctcc 2160
270 tcgcagtaac tcatcattag accccaaata ggaggaatgt aaatttgtaa caaagctttt 2220
271 tgtttttgct taagttagtc atttatttta ctcccaa 2257
274 <210> SEQ ID NO: 4
275 <211> LENGTH: 23
276 <212> TYPE: DNA
277 <213> ORGANISM: Artificial Sequence
279 <220> FEATURE:
280 <223> OTHER INFORMATION: Description of Artificial Sequence: Primer
282 <400> SEQUENCE: 4
283 gtcggaccac agttgataag aat 23
286 <210> SEQ ID NO: 5
287 <211> LENGTH: 22
288 <212> TYPE: DNA
289 <213> ORGANISM: Artificial Sequence
291 <220> FEATURE:
292 <223> OTHER INFORMATION: Description of Artificial Sequence: Primer
294 <400> SEQUENCE: 5
295 tcgcagataa ggagactaac ca 22
298 <210> SEQ ID NO: 6
299 <211> LENGTH: 19
300 <212> TYPE: DNA
301 <213> ORGANISM: Artificial Sequence
303 <220> FEATURE:
304 <223> OTHER INFORMATION: Description of Artificial Sequence: Primer
306 <400> SEQUENCE: 6
307 gagttccgcg accctttac 19
310 <210> SEQ ID NO: 7
311 <211> LENGTH: 23
312 <212> TYPE: DNA

```

VERIFICATION SUMMARY

PATENT APPLICATION: US/09/890,475

DATE: 01/22/2002

TIME: 16:34:41

Input Set : A:\mewburn.app

Output Set: N:\CRF3\01182002\I890475.raw

L:12 M:271 C: Current Filing Date differs, Replaced Current Filing Date